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EXAMINER

STAICOVICI, STEFAN

ART UNIT

PAPER NUMBER

1732

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7

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/806,417

Applicant(s)

SEKIDO ET AL.

Examiner

Stefan Staicovici

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 1-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 26-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group II, claims 26-43 in Paper No. 6 is acknowledged.

### ***Specification***

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "Method of Manufacturing a Hollow Structure of Fiber-Reinforced Resin."
3. The abstract of the disclosure is objected to because the abstract should be a concise statement of the manufacturing method of a hollow fiber reinforced structure. Correction is required. See MPEP § 608.01(b).

### ***Claim Objections***

4. Claim 43 is objected to because of the following informalities: it is unclear what Applicants are referring by "join" in lines 11-12. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 28, 30 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Calapp *et al.* (US Patent No. 5,746,955).

Regarding claim 28, Calapp *et al.* ('955) teach the claimed process for forming a non-circular, hollow fiber-reinforced structure including, providing a non-circular mandrel (35), placing said mandrel between spindles (32, 33) on a winding machine and winding a plurality of fibers around said mandrel (35) to form a wound mandrel, placing said wound mandrel in a mold cavity defined between mold halves (39, 40), applying a vacuum to said mold cavity, injecting a resin into said mold cavity to impregnate said fibers and curing said resin to form said non-circular, hollow fiber-reinforced structure (see col. 7, lines 23-34; col. 8, lines 33-40; col. 9, lines 4-31).

In regard to claim 30, Calapp *et al.* ('955) teach a hollow, non-circular mandrel (35) (see Figure 7).

Specifically regarding claim 41, Calapp *et al.* ('955) teach removal of said non-circular mandrel (35) (see col. 9, lines 37-47).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. Claims 26-33, 37 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/32589 in view of Nelson *et al.* (US Patent No. 5,985,197).

WO 98/32589 teaches the basic claimed process for forming a non-circular, hollow fiber-reinforced structure including, providing an inner mold (mandrel) (40) and an elastomeric bladder (42) onto a stand, winding a plurality of fiber-reinforced layers onto said inner mold (mandrel) (40) by wrapping a plurality of fibers to form a wrapped assembly, placing a vacuum bag (100) around said wrapped assembly to form a bagged assembly, drawing a vacuum onto said bagged assembly and curing said fiber-reinforced layers under conditions of pressure and temperature (see Abstract and pages 21-22).

Regarding claim 26, WO 98/32589 does not teach resin injection. Nelson *et al.* ('197) teach a molding process for forming a non-circular, hollow fiber-reinforced structure including, providing an inner mold, covering said inner mold with an elastomeric bladder, placing a plurality of fiber-reinforced layers onto said bladder by wrapping a plurality of fibers to form a wrapped assembly, placing said wrapped assembly into a mold and curing said fiber-reinforced layers under conditions of pressure and temperature (see Abstract). Further, Nelson *et al.* ('197) teach that resin impregnation of a fiber occurs before or after placement of said fibers in said mold, hence teaching that resin injection and resin pre-impregnation are equivalent alternatives. Therefore, it would have been obvious for one of ordinary skill in the art to have provided resin impregnation after placing a fiber-reinforced layer in a mold as taught by Nelson *et al.* ('197) in the process of WO 98/32589 because, Nelson *et al.* ('197) specifically teach that resin injection and resin pre-impregnation are equivalent alternatives to providing a resin to a fiber reinforced structure.

In regard to claim 27, WO 98/32589 teaches curing at a temperature of 350 °F (50-200 °C) (see page 33).

Specifically regarding claim 28, WO 98/32589 teaches the use of a vacuum bag (100) and clam shells (30, 32).

Regarding claim 29, WO 98/32589 teaches a bladder (40) covering said mandrel and expanding said bladder to compress said fiber against an interior surface of said clam shells (30, 32). Further, Nelson *et al.* ('197) teach expanding said bladder and compressing said fibers against the interior of the mold. Further, Nelson *et al.* ('197) teach that resin impregnation of a fiber occurs before or after placement of said fibers in said mold, hence teaching that resin injection and resin pre-impregnation are equivalent alternatives. Therefore, it would have been obvious for one of ordinary skill in the art to have provided resin impregnation after placing a fiber-reinforced layer in a mold as taught by Nelson *et al.* ('197) in the process of WO 98/32589 because, Nelson *et al.* ('197) specifically teach that resin injection and resin pre-impregnation are equivalent alternatives to providing a resin to a fiber reinforced structure. Furthermore, it is submitted that during resin injection in the process of WO 98/32589 in view of Nelson *et al.* ('197) the resin diffuses through the fibers in order for impregnation to occur and the resulting molded article to form a fiber-reinforced structure.

In regard to claims 30-33, WO 98/32589 teaches a hollow mandrel that allows a fluid to be transported through said mandrel and expelled through a plurality of orifices (40e) to force an elastomeric bladder positioned over said mandrel outward against the interior surface of clam shells (30, 32) (see page 13). Further, regarding claim 33, WO 98/32589 teaches air under pressure of 15 psi (0.1 Mpa) (see page 21).

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Specifically regarding claim 37, WO 98/32589 teaches an elastomeric bladder as an inner mold.

Regarding claim 41, WO 98/32589 teaches removing the mandrel (see pages 30-31).

9. Claims 28, 30-32, 37-38, 40-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holloway (US Patent No. 5,080,850) in view of Calapp *et al.* (US Patent No. 5,746,955).

Holloway ('850) teaches the basic claimed process for molding a non-circular, hollow fiber-reinforced structure including, blow-molding a core, winding a plurality of fibers around said core, placing said wrapped core in a mold, drawing a vacuum in said mold while collapsing said core and injecting a resin into said mold to impregnate said fibers, curing said resin under heat and pressure by re-expanding said core (see col. 3, line 50 through col. 5, line 55).

Regarding claim 28, although Holloway ('850) teaches winding a plurality of fibers around said core, Holloway ('850) does not teach a stand. Calapp *et al.* ('955) teach a process for forming a non-circular, hollow fiber-reinforced structure including, providing a non-circular mandrel (35), placing said mandrel between spindles (32, 33) on a winding machine and winding a plurality of fibers around said mandrel (35) to form a wound mandrel, placing said wound mandrel in a mold cavity defined between mold halves (39, 40), applying a vacuum to said mold cavity, injecting a resin into said mold cavity to impregnate said fibers and curing said resin to form said non-circular, hollow fiber-reinforced structure (see col. 7, lines 23-34; col. 8, lines 33-40; col. 9, lines 4-31). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a winding machine having spindles (stand) as taught by Calapp *et al.* ('955) in the process of Holloway ('850) because Holloway ('850) specifically teaches winding a plurality of fibers around a core, whereas Calapp *et al.* ('955) teaches that a winding machine having

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spindles allows winding a plurality of fibers around a core and also because both references teach similar materials and processes.

In regard to claims 30-32, Holloway ('850) teach a hollow, flexible inner mold that is pressurized (expanded) during curing.

Specifically regarding claim 37, Holloway ('850) teach a plastic inner mold.

Regarding claims 38 and 43, Holloway ('850) teaches joining under vacuum a plurality of fiber reinforced structures to form an integral component (see Figure 7).

In regard to claim 40, Holloway ('850) teach a blow-molded inner mold.

Specifically regarding claims 41-42, Holloway ('850) teach that the inner mold is removed from the resulting structure or is left as an integral component of said fiber reinforced structure (see col. 5, line 67 through col. 6, line 2).

10. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holloway (US Patent No. 5,080,850) in view of Calapp *et al.* (US Patent No. 5,746,955) and in further view of Johnson *et al.* (US Patent No. 5,169,590).

Holloway ('850) in view of Calapp *et al.* ('955) teach the basic claimed process as described above.

Regarding claim 34, Holloway ('850) in view of Calapp *et al.* ('955) do not teach an inner mold having grooves molded therein. Johnson *et al.* ('590) teach a molding process including, providing a blow-molded core (10') having a plurality of grooves (26) molded therein, wrapping said core with fiberglass tows (36) and placing said wrapped core in a mold while injecting a resin that flows along grooves (26) to impregnate said fiberglass tows (36) (see col. 2, line 46 through col. 3, line 24). Therefore, it would have been obvious for one of ordinary skill in



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the art to have provided a plurality of grooves as taught by Johnson *et al.* ('590) in the core in the process of Holloway ('850) in view of Calapp *et al.* ('955) because, Johnson *et al.* ('590) specifically teaches that such grooves allow for a rapid and uniform impregnation, hence forming an improved product (see col. 3, lines 20-25) and also because both Johnson *et al.* ('590) and Calapp *et al.* ('955) teach blow molded cores used in a resin transfer molding process to form a non-circular, hollow fiber-reinforced structure.

11. Claims 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holloway (US Patent No. 5,080,850) in view of Calapp *et al.* (US Patent No. 5,746,955) and in further view of Tunis, III *et al.* (US Patent No. 6,159,414).

Holloway ('850) in view of Calapp *et al.* ('955) teach the basic claimed process as described above.

Regarding claims 34-36, Holloway ('850) in view of Calapp *et al.* ('955) do not teach a resin distribution medium. Tunis, III *et al.* ('414) teach a molding process including, providing a core, wrapping said core with fiber-reinforced material to form a wrapped core, wrapping said wrapped core in a vacuum bag assembly, drawing a vacuum and injecting a resin into said bag to form a fiber reinforced article (see Abstract). Further, Tunis, III *et al.* ('414) teach alternative methods of distributing resin, specifically forming grooves in the core or providing an open weave fabric (see col. 6, lines 18-35). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a resin distribution medium, specifically either forming grooves in the core or providing an open weave fabric as taught by Tunis, III *et al.* ('414) in the process of Holloway ('850) in view of Calapp *et al.* ('955) because, Tunis, III *et al.* ('414) specifically

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teach that a resin distribution provides for improved resin flow that improves interlaminar shear strength, hence improving product quality.

12. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holloway (US Patent No. 5,080,850) in view of Calapp *et al.* (US Patent No. 5,746,955) and in further view of WO 98/30374.

Holloway ('850) in view of Calapp *et al.* ('955) teach the basic claimed process as described above.

Regarding claim 39, Holloway ('850) in view of Calapp *et al.* ('955) do not teach a retainer. WO 98/30374 teach the use of a tackifier (retainer) between fiber reinforced layers to form a preform prior to subjecting said tackified fiber reinforced preform to a resin transfer molding process 9see page1, line 7-9 and page 2, lines 22-29). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a tackifier (retainer) as taught by WO 98/30374 in the process of Holloway ('850) in view of Calapp *et al.* ('955) because, WO 98/30374 specifically teaches that a tackifier (retainer) provides for improved preforms to be used in a resin transfer molding process such as that of Holloway ('850) in view of Calapp *et al.* ('955).

### ***Conclusion***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (703) 305-

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0396. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM and alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard D. Crispino, can be reached at (703) 308-3853. The fax phone number for this Group is (703) 305-7718.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Stefan Staicovici, PhD



Primary Examiner

6/15/03

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June 15, 2003